

## WHAT IS CLAIMED IS

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1. A sheet punch device for punching a sheet with a punch edge, comprising:  
a motor performing a punching operation;  
a position detection unit detecting a position of the  
10 punch edge; and  
a control unit controlling the motor and the position  
detection unit, wherein the control unit causes the position detection  
unit to detect a position of the punch edge at a time of or prior to a  
motor stop in a first driving operation of the motor to perform the  
15 punching operation, and, when the detected position deviates from a  
desired position, the control unit performs restarting of the motor so  
that the punch edge is brought close to the desired position.

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2. A sheet punch device for punching a sheet with a punch edge, comprising:  
a motor performing a punching operation;  
25 a position detection unit detecting a position of the

punch edge; and

a control unit controlling the motor and the position detection unit, wherein the control unit causes the position detection unit to detect a position of the punch edge at a time of or prior to a motor stop in a first driving operation of the motor to perform the punching operation, and, when the detected position deviates from a desired position, the control unit changes a motor-drive amount to restart the motor, in accordance with an amount of the deviation of the detected position from the desired position.

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3. The sheet punch device according to claim 1 wherein  
15 the control unit is provided to cause the position detection unit to detect a position of the punch edge when a predetermined time has elapsed after a start of the first driving operation of the motor, so that the control unit determines an amount of the deviation of the detected position from the desired position and performs the  
20 restarting of the motor based on the amount of the deviation.

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4. The sheet punch device according to claim 3 wherein

the control unit is provided to set the predetermined time such that the predetermined time passes before the time of the motor stop, and set an amount of the deviation of the punch edge position to a position preceding an original stop position in a motor rotation direction.

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10 5. The sheet punch device according to claim 1 wherein the control unit is provided to start conveyance of the punched sheet prior to the motor stop in the first driving operation of the motor.

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20 6. The sheet punch device according to claim 5 further comprising a home-position detection unit detecting that the punch edge is evacuated from a sheet transport edge, wherein the control unit is provided to start conveyance of the sheet prior to the motor stop in the first driving operation of the motor and after the punch edge is detected as being evacuated from the sheet transport edge by the home-position detection unit.

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7. The sheet punch device according to claim 1 wherein  
the position detection unit comprises a home-position detection unit  
detecting that the punch edge is evacuated from a sheet transport  
edge, and a motor-drive amount detection unit, and the control unit  
5 is provided to determine a position of the punch edge based on an  
amount of driving of the motor detected by the motor-drive amount  
detection unit starting from a time the punch edge is detected as  
being evacuated from the sheet transport edge by the home-position  
detection unit after a start of the first driving operation of the motor.

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8. The sheet punch device according to claim 7 further  
15 comprising a timer unit detecting that a predetermined time has  
elapsed during the driving of the motor, wherein the motor-drive  
amount detection unit detects an amount of driving of the motor at  
an end of the predetermined time, and the control unit is provided to  
change a starting position of a motor stop operation in the first  
20 driving operation of the motor, based on an amount of driving of the  
motor detected by the motor-drive amount detection unit.

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9. The sheet punch device according to claim 7 wherein  
the motor-drive amount detection unit detects a motor stop position  
in a first driving operation of the motor to perform an initial  
operation and the punching operation, and the control unit is  
5 provided to change a motor stop operation in a subsequent driving  
operation of the motor, based on the motor stop position detected by  
the motor-drive amount detection unit.

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10. The sheet punch device according to claim 1 wherein  
the motor is a DC brush motor, and the control unit is provided to  
perform a motor stop operation by short-circuiting the DC brush  
15 motor.

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11. The sheet punch device according to claim 1 wherein  
the motor is a DC brush motor, and the control unit is provided to  
perform a motor stop operation by using both reverse braking and  
short-circuiting of the DC brush motor.

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12. The sheet punch device according to claim 11  
wherein the control unit is provided to perform the motor stop  
operation by using both reverse braking and short-circuiting of the  
motor at the time of the motor stop in the first driving operation of  
5 the motor to perform the punching operation.

10 13. The sheet punch device according to claim 12  
wherein the control unit is provided to change a braking time of a  
reverse braking operation during the first driving operation of the  
motor to perform the punching operation, based on an amount of  
driving of the motor detected by a motor-drive amount detection unit  
15 at an end of a predetermined time after a start of the first driving  
operation of the motor.

20 14. The sheet punch device according to claim 13  
wherein the motor-drive amount detection unit detects the amount of  
driving of the motor at the end of the predetermined time prior to a  
start of the reverse braking operation.

15. The sheet punch device according to claim 13  
wherein the control unit is provided to perform the detection of the  
motor-drive amount and the reverse braking operation at a plurality  
of times.

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16. The sheet punch device according to claim 13  
10 wherein the control unit is provided not to perform the reverse  
braking operation when the detected motor-drive amount is smaller  
than a predetermined amount.

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17. A sheet processing device in which a sheet punch  
device for punching a sheet with a punch edge is provided,  
comprising a sheet processing unit receiving the sheet, performing  
20 post-processing of the sheet including a punching operation on the  
sheet, and ejecting the punched sheet,

the sheet punch device comprising:  
a motor performing the punching operation;  
a position detection unit detecting a position of the  
25 punch edge; and

a control unit controlling the motor and the position detection unit, wherein the control unit causes the position detection unit to detect a position of the punch edge at a time of or prior to a motor stop in a first driving operation of the motor to perform the 5 punching operation, and, when the detected position deviates from a desired position, the control unit performs restarting of the motor so that the punch edge is brought close to the desired position.

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18. An image forming system in which a sheet processing device and an image forming device are provided integrally or separately, the sheet processing device comprising:  
15 a sheet punch device punching a sheet with a punch edge; and  
a sheet processing unit receiving the sheet, performing post-processing of the sheet including a punching operation, and ejecting the punched sheet,  
20 the sheet punch device comprising:  
a motor performing the punching operation;  
a position detection unit detecting a position of the punch edge; and  
a control unit controlling the motor and the position detection unit, wherein the control unit causes the position detection

unit to detect a position of the punch edge at a time of or prior to a motor stop in a first driving operation of the motor to perform the punching operation, and, when the detected position deviates from a desired position, the control unit performs restarting of the motor so 5 that the punch edge is brought close to the desired position.

10           19. A computer program product embodied therein for causing a computer to execute a method of controlling a sheet punch device for punching a sheet with a punch edge, the sheet punch device including a motor performing a punching operation, and a position detection unit detecting a position of the punch edge, the 15 method comprising steps of:

                  causing the position detection unit to detect a position of the punch edge at a time of or prior to a motor stop in a first driving operation of the motor to perform the punching operation; and

20            performing, when the detected position deviates from a desired position, restarting of the motor so that the punch edge is brought close to the desired position.

20. A computer program product embodied therein for causing a computer to execute a method of controlling a sheet punch device for punching a sheet with a punch edge, the sheet punch device including a motor performing a punching operation, and a 5 position detection unit detecting a position of the punch edge, the method comprising steps of:

causing the position detection unit to detect a position of the punch edge at a time of or prior to a motor stop in a first driving operation of the motor to perform the punching operation; 10 and

changing, when the detected position deviates from a desired position, a motor-drive amount to restart the motor, in accordance with an amount of the deviation of the detected position from the desired position.

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20. 21. A sheet punch device for punching a sheet delivered from an external device, comprising:

a motor performing a punching operation on the sheet; a motor-drive amount detection unit detecting an amount of driving of the motor; a timer unit detecting that a predetermined standard time 25 has elapsed during the driving of the motor; and

a control unit causing the motor drive amount detection unit to detect a motor-drive amount of the motor during the punching operation at a time the standard time has elapsed, and the control unit changing a starting position of a motor stop operation in accordance with the detected motor-drive amount.

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22. The sheet punch device according to claim 21 wherein the timer unit is provided to detect that the predetermined standard time has elapsed after a start of the motor driving.

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23. A sheet punch device provided in a sheet processing device for punching a sheet received at the sheet processing device, the sheet processing device performing post-processing of the sheet, the sheet punch device comprising:

a motor performing a punching operation on the sheet;  
a motor-drive amount detection unit detecting an amount of driving of the motor;  
a home-position detection unit detecting a home position of a punch edge; and

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a control unit causing the motor-drive amount detection unit and the home-position detection unit to detect a motor stop position when a punching operation including an initial operation is performed by the motor, and the control unit changing a motor stop 5 operation when a subsequent punching operation is performed by the motor at a time following the initial operation, in accordance with the detected motor stop position during the initial operation.

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24. The sheet punch device according to claim 23 wherein the control unit is provided to cause the motor-drive amount detection unit and the home-position detection unit to detect a motor stop position when the initial operation is performed, and the control 15 unit changing the motor stop operation when a subsequent punching operation is performed at a time following the initial operation, in accordance with the detected motor stop position during the initial operation.

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25. The sheet punch device according to claim 23 wherein the control unit is provided to cause the motor-drive amount

detection unit and the home-position detection unit to detect a motor stop position when the punching operation including the initial operation is performed, and the control unit changing the motor stop operation when a subsequent punching operation is performed, in accordance with the detected motor stop position during the previous punching operation.

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26. The sheet punch device according to claim 23  
wherein the control unit is provided to cause the motor-drive amount  
detection unit and the home-position detection unit to detect a motor  
stop position when the punching operation including the initial  
15 operation is performed, and the control unit changing the motor stop  
operation when a subsequent punching operation is performed, in  
accordance with a set of motor stop positions detected during  
previous punching operations.

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27. The sheet punch device according to claim 25  
wherein, when the punching operation is performed continuously,  
25 the control unit is provided to perform a punching operation without

sheet, before a first sheet for an arbitrary job is received, so that a motor stop position is detected, and the control unit changing a motor stop operation in a punching operation of the first sheet in accordance with the detected motor stop position.

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28. The sheet punch device according to claim 23  
10 wherein the motor is a DC brush motor, and the motor stop operation is performed by short-circuiting the DC brush motor.

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29. The sheet punch device according to claim 23  
wherein the motor is a DC brush motor, and the motor stop operation is performed by using reverse braking and short-circuiting of the DC brush motor.

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30. A sheet processing device in which a sheet punch  
25 device for punching a sheet is provided, the sheet processing device

receiving the sheet and performing post-processing of the sheet, the sheet punch device comprising:

a motor performing a punching operation on the sheet;

a motor-drive amount detection unit detecting an amount

5 of driving of the motor;

a home-position detection unit detecting a home position of a punch edge; and

a control unit causing the motor-drive amount detection unit and the home-position detection unit to detect a motor stop 10 position when a punching operation including an initial operation is performed by the motor, and the control unit changing a motor stop operation when a subsequent punching operation is performed by the motor at a time following the initial operation, in accordance with the detected motor stop position during the initial operation.

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31. An image forming system in which a sheet 20 processing device and an image forming device are provided, the sheet processing device including a sheet punch device for punching a sheet, the sheet processing device receiving the sheet and performing post-processing of the sheet, the sheet punch device comprising:

25 a motor performing a punching operation on the sheet;

a motor-drive amount detection unit detecting an amount of driving of the motor;

a home-position detection unit detecting a home position of a punch edge; and

5 a control unit causing the motor-drive amount detection unit and the home-position detection unit to detect a motor stop position when a punching operation including an initial operation is performed by the motor, and the control unit changing a motor stop operation when a subsequent punching operation is performed by the  
10 motor at a time following the initial operation, in accordance with the detected motor stop position during the initial operation.

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32. A sheet punch device for punching a sheet with a punch edge, comprising:

motor means for performing a punching operation;

position detection means for detecting a position of the

20 punch edge; and

control means for controlling the motor means and the position detection means, wherein the control means causes the position detection means to detect a position of the punch edge at a time of or prior to a motor stop in a first driving operation of the  
25 motor means to perform the punching operation, and, when the

detected position deviates from a desired position, the control means performs restarting of the motor means so that the punch edge is brought close to the desired position.

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33. A sheet punch device for punching a sheet with a punch edge, comprising:

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34. A sheet processing device in which a sheet punch device for punching a sheet with a punch edge is provided, comprising a sheet processing unit receiving the sheet, performing post-processing of the sheet including a punching operation on the sheet, and ejecting the punched sheet,

the sheet punch device comprising:  
motor means for performing the punching operation;  
position detection means for detecting a position of the punch edge; and

control means for controlling the motor means and the position detection means, wherein the control means causes the position detection means to detect a position of the punch edge at a time of or prior to a motor stop in a first driving operation of the motor means to perform the punching operation, and, when the detected position deviates from a desired position, the control means performs restarting of the motor means so that the punch edge is brought close to the desired position.

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35. An image forming system in which a sheet processing device and an image forming device are provided integrally or separately, the sheet processing device comprising:  
a sheet punch device punching a sheet with a punch

edge; and

a sheet processing unit receiving the sheet, performing post-processing of the sheet including a punching operation, and ejecting the punched sheet,

5 the sheet punch device comprising:

motor means for performing the punching operation; position detection means for detecting a position of the punch edge; and

control means for controlling the motor means and the 10 position detection means, wherein the control means causes the position detection means to detect a position of the punch edge at a time of or prior to a motor stop in a first driving operation of the motor means to perform the punching operation, and, when the detected position deviates from a desired position, the control means 15 performs restarting of the motor means so that the punch edge is brought close to the desired position.

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36. A sheet punch device for punching a sheet delivered from an external device, comprising:

motor means for performing a punching operation on the sheet;

25 motor-drive amount detection means for detecting an

amount of driving of the motor means;

timer means for detecting that a predetermined standard time has elapsed during the driving of the motor means; and control means for causing the motor drive amount

5 detection means to detect a motor-drive amount of the motor means during the punching operation at a time the standard time has elapsed, and the control means changing a starting position of a motor stop operation in accordance with the detected motor-drive amount.

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37. A sheet punch device provided in a sheet processing device for punching a sheet received at the sheet processing device, the sheet processing device performing post-processing of the sheet, the sheet punch device comprising:

motor means for performing a punching operation on the sheet;

20 motor-drive amount detection means for detecting an amount of driving of the motor means;

home-position detection means for detecting a home position of a punch edge; and

control means for causing the motor-drive amount 25 detection means and the home-position detection means to detect a

motor stop position when a punching operation including an initial operation is performed by the motor means, and the control means changing a motor stop operation when a subsequent punching operation is performed by the motor means at a time following the 5 initial operation, in accordance with the detected motor stop position during the initial operation.

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38. A sheet processing device in which a sheet punch device for punching a sheet is provided, the sheet processing device receiving the sheet and performing post-processing of the sheet, the sheet punch device comprising:

15                   motor means for performing a punching operation on the sheet;

                      motor-drive amount detection means for detecting an amount of driving of the motor means;

20                   home-position detection means for detecting a home position of a punch edge; and

                      control means for causing the motor-drive amount detection means and the home-position detection means to detect a motor stop position when a punching operation including an initial operation is performed by the motor means, and the control means changing a motor stop operation when a subsequent punching 25

operation is performed by the motor means at a time following the initial operation, in accordance with the detected motor stop position during the initial operation.

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39. An image forming system in which a sheet processing device and an image forming device are provided, the 10 sheet processing device including a sheet punch device for punching a sheet, the sheet processing device receiving the sheet and performing post-processing of the sheet, the sheet punch device comprising:

motor means for performing a punching operation on the 15 sheet;

motor-drive amount detection means for detecting an amount of driving of the motor means;

home-position detection means for detecting a home position of a punch edge; and

20 control means for causing the motor-drive amount detection means and the home-position detection means to detect a motor stop position when a punching operation including an initial operation is performed by the motor means, and the control means changing a motor stop operation when a subsequent punching 25 operation is performed by the motor means at a time following the

initial operation, in accordance with the detected motor stop position  
during the initial operation.

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